Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
	)	
Second Periodic Review of the	)	MB Docket No. 03-15
Commission's Rules and Policies	)	
Affecting the Conversion	)	RM 9832
To Digital Television	)	
	)	
Public Interest Obligations of TV	)	MM Docket No. 99-360
Broadcast Licensees	)	
	)	
Children's Television Obligations of	)	MM Docket No. 00-167
Digital Television Broadcasters	)	
	)	
Standardized and Enhanced Disclosure	)	MM Docket No. 00-168
Requirements for Television Broadcast	)	
Licensee Public Interest Obligations	)	

COMMENTS OF

Statewide Wireless Network

New York State Office for Technology

State Capitol, ESP

P.O. Box 2062

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April 21, 2003

1. The New York State Office for Technology (NYS-OFT) hereby submits the following comments in response to the Commission's *Notice of Proposed Rulemaking*, FCC 03-8 (released January 27, 2003) ("*NPRM*"), in the above-captioned proceeding.

2. The New York State Office for Technology, on behalf of the State of New York, is in the process of procuring a new Statewide Wireless Network (SWN) for State, Federal and Local Governmental entities that operate within New York State's geographic borders. SWN will provide an integrated mobile radio communications network that will be utilized by both Public Safety and Public Service agencies in New York State. It will have a digital, trunked architecture with both voice and data capabilities, and will be used in day-to-day operations, as well as for disaster and emergency situations, to more effectively and efficiently coordinate the deployment of all levels of government resources to such incidents. It will also enhance international coordination along the US/Canadian border, and play a critical role in supporting the homeland defense efforts within the State of New York.

3. The State of New York has obtained a statewide license to operate a significant portion of the SWN in the "Upper 700 MHz Band." However, that spectrum is blocked by analog television stations in many of the most heavily populated areas of New York. As such, NYS-OFT has a direct interest in Commission rules that could enhance the ability of Public Safety mobile radio licensees to utilize that spectrum as soon possible.

SUMMARY

4. The pace and extent of the digital television (DTV) transition is of critical important to the State of New York and to Public Safety agencies throughout the nation. Until television stations vacate the Upper 700 MHz band, New York will have restricted access to the 24 MHz of spectrum for Public Safety use in the band. Yet the communications requirements of Public Safety agencies such as New York are greater than ever before, and cannot wait for the uncertain end of the DTV transition. Therefore, the Commission must take every reasonable step within in its authority to maximize the extent to which Public Safety can use the Upper 700 MHz band during the remainder of the transition period. The Commission must also interpret existing rulings in a manner that will expedite the day when the entire band is clear of broadcast stations and available for Public Safety communications nationwide.

5. The Commission should establish clear interference guidelines that protect incumbent broadcasters, but only to the extent absolutely necessary to avoid interference to actual operations. Overly broad protection of incumbents serves no useful purpose, and will place unnecessary and arbitrary restrictions on the ability of Public Safety licensees to utilize the Upper 700 MHz band pending the completion of the DTV transition.

6. The Communications Act currently allows incumbent broadcast stations to extend the DTV transition date if certain DTV market penetration levels have not been met. The Commission's rules implementing those provisions must be premised on the need to clear the Upper 700 MHz as quickly as possible. Thus, definitions and guidelines

used to describe the degree to which DTV signals are available should be narrowly prescribed to prevent unjustified delays in the DTV transition.

CONTENTS

I. THE COMMISSION MUST MAXIMIZE AND EXPEDITE PUBLIC SAFETY USE OF THE UPPER 700 MHZ BAND.

7. On September 11, 1996, the Public Safety Wireless Advisory Committee adopted a Report recommending that 24 MHz of spectrum from the 746-806 MHz band be made available for Public Safety radio services within at least five years.[1] Exactly five years later, when tragedy struck New York City and the Pentagon, that spectrum was still not available in most of the nation. Pursuant to a Congressional mandate, the FCC did allocate the 764-776/794-806 MHz band (TV channels 63, 64, 68, and 69) for Public Safety services in 1998.[2] Yet, TV station operations on those and adjacent channels continue to prevent nationwide Public Safety use of the reallocated spectrum.

8. The Commission must take every reasonable step within its statutory authority to expedite the clearing of TV stations from the Upper 700 MHz band and, in the meantime, maximize the ability of Public Safety agencies to use portions of the band wherever possible. This proceeding provides an opportunity to do both, by limiting the area in which incumbent TV stations are afforded interference protection, and by not allowing extensions of the DTV transition date beyond that which is expressly required by the Section309(j)(14)(B) of the Communications Act.

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[1] The Public Safety Wireless Advisory Committee (PSWAC) was created by the FCC and NTIA to examine Public Safety spectrum requirements through the year 2010. The PSWAC recommendations and related issues are discussed in WT Docket 96-86.

[2] *Report and Order in ET Docket 97-157*, 12 FCC Rcd 22953 (1998).

9. The importance of the Upper 700 MHz Band spectrum to Public Safety agencies cannot be overstated. Police, fire, EMS and other Public Safety agencies across the country face severe shortages of radio spectrum, causing dangerous congestion on existing channels, preventing the implementation of new communications tools, and exacerbating the lack of interoperability between first responders in the field.

10. The new 700 MHz spectrum will address many of these concerns. First, the additional spectrum capacity will relieve congestion, especially in major metropolitan areas where all existing Public Safety spectrum allocations are over-crowded. Second, the 700 MHz band will permit agencies to implement new Public Safety communications tools, such as wideband mobile data systems. These tools are especially important if the nation's Public Safety agencies are to deliver the state-of-the-art capabilities essential to their homeland security responsibilities.

11. Finally, a major national benefit of the 700 MHz Public Safety band is the substantive improvement in interoperability. Today, first responders from different agencies arriving at an emergency scene are often unable to communicate with each other by radio. This lack of interoperability has many causes, the most common being that Public Safety agencies in the same region (and in some cases the same jurisdiction) operate on incompatible radio frequencies in different portions of the radio spectrum. That, in turn, is most often caused by the lack of sufficient spectrum in any particular frequency band to accommodate the diverse users in a region.

12. The 700 MHz band helps to alleviate the interoperability problem in several respects. The band provides capacity for new multi-agency and multi-jurisdictional radio

systems, such as New York State's SWN. Similar systems have been constructed in the 800 MHz band, but those frequencies are no longer available in much of the nation as demand has far outstripped supply. Fortunately, the 700 MHz band is "close enough" to the 800 MHz to facilitate interoperability between these two major sources of Public Safety radio spectrum. Finally, the FCC has taken special steps to promote interoperability within the 700 MHz band, by allotting a significant portion of the band specifically for interoperability purposes and by designating a digital standard to ensure equipment capability on those designated channels.[3]

13. The Upper 700 MHz Band is thus of critical importance to our nation's Public Safety agencies. Yet, the ability of those agencies to realize the benefits of this spectrum is severely limited by ongoing TV station operations in the band. The Commission must take every reasonable step within its authority to reduce the impact of those stations, both short-term and long-term.

II. TECHNICAL AREAS AND INTERFERENCE CRITERIA

14. The Commission has sought comment on several technical issues regarding the DTV transition. Our general comments embody an overall philosophy that seeks to maximize and expedite Public Safety (and commercial) utilization of 700 MHz spectrum, while at the same time ensuring that band sharing will be free from interference. The areas of the country where Public Safety needs this spectrum most are also the areas most populated with television operations on Channels 60-69.

[3] *See*, 47 C.F.R. §§90.547 and 90.548.

15. We have chosen to address only a handful of the technical issues that the Commission has put forth in this NPRM. However, within these we see an opportunity for the Commission to allow for enhanced sharing and utilization of the spectrum during the DTV transition period. We look to ease the process of allowing an out-of-core analog station to switch their current operations to their in-core DTV assignment - clearing the way for Public Safety access to their allotted spectrum. We further provide comment on the need for an out-of-core service area replication deadline, as well as insight on the area that is to be provided protection during operations with reduced parameters. Finally, we encourage the Commission to provide guidance on what types of engineering studies will be deemed acceptable in petitions for Public Safety short-spacing to broadcast operations.

16. We also ask the Commission to examine the current technical parameters for interference protection, and decide if they may be too conservative - ultimately reducing the availability of the 700 MHz spectrum with regards to Public Safety (and commercial) operations. We provide supporting technical documentation that supports this request, included here as *Annex-A*

17. *Technical Parameters for Protection*.

Early DTV/In-Core Analog Transition Swaps

18. For some time now the Commission has allowed for broadcasters with out-of-core analog licenses and in-core DTV allotments to move their current analog operations to their DTV allotment, facilitating the early reclamation of Public Safety spectrum in the affected areas. Because of this, broadcasters were given an incentive to elect such

an operational shift - they were made exempt from the mandatory commencement deadline for DTV over-the-air operations[4].

19. The effects of even a few stations electing to take advantage of this changeover can and has been quite dramatic. An example of this is illustrated in Figure 1. On the left side of this figure we see areas where Public Safety operations on channels 63 and 68 (top) and 64 and 69 (bottom) are currently blocked by TV/DTV operations. Here, solid fill indicates area within Grade-B contours, or areas where Public Safety mobile and/or base operations are blocked. On the right side we see the blockage for these corresponding cases, except where three upstate New York stations elect to move current analog operations to their digital allotment. Clearly this changeover would enable Public Safety to access their 700 MHz spectrum over a large portion of the upper region of the state[5].

[4] However, this implied that a hard cutover to DTV operations would be required when analog operations eventually cease.

[5] Although similar concepts could be applied in the Metropolitan New York City area, it would require many more broadcast stations to elect this option.

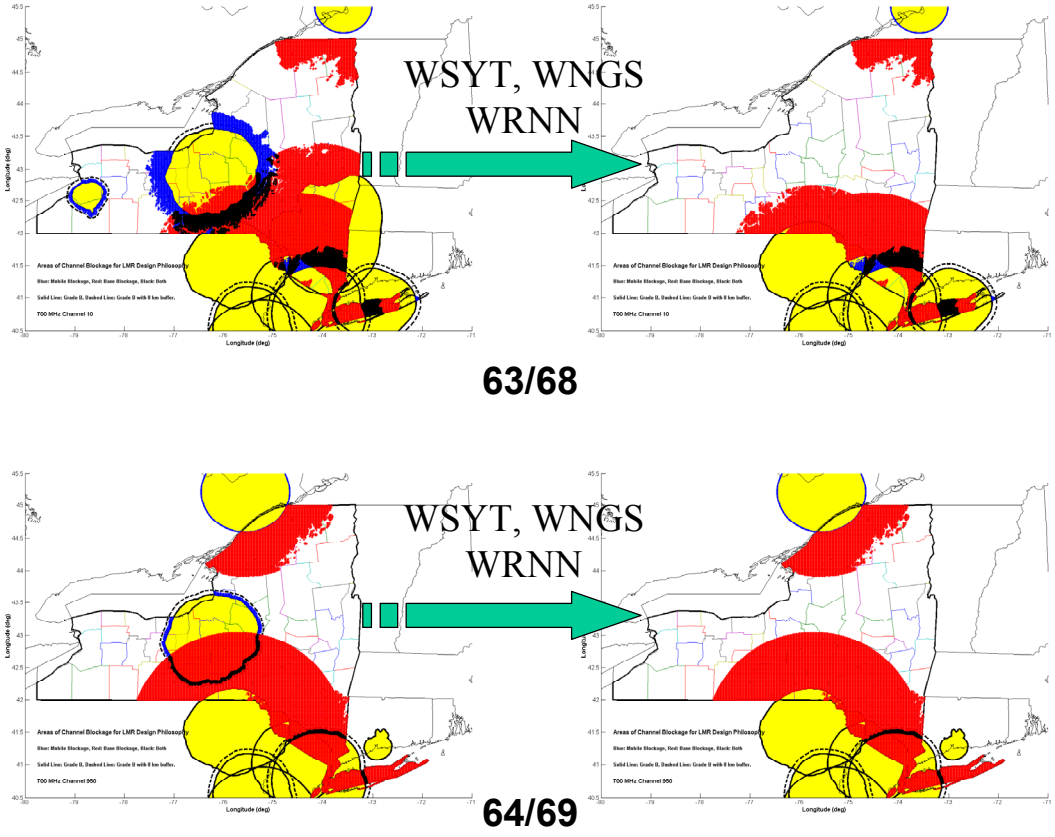

Figure 1: TV/DTV blockage of New York State 700 MHz Public Safety Operations

20. An important consideration regarding the changeover is the Taboo channel separation requirements. These requirements constrain the number of instances where such a changeover can be considered viable. Because of the spectrum benefits realized as a result of vacating out-of-core operations, such choices should continue to be encouraged. As such, Taboo separation criteria should not be an obstacle to those who wish to make this choice. It appears that past receiver testing has driven the Taboo separation requirements specified by the Commission. However, the last such study that looked at NTSC-to-NTSC[6] receiver intermodulation appears to have been

[6] The Commission investigated ATSC-to-NTSC, NTSC-to-ATSC, and ATSC-to-ATSC taboo interference approximately eight years ago during the tenure of the Advisory Council on Advanced Television Service. However, within this investigation there was no reference to NTSC-to-NTSC effects. See *Final Technical*

in 1987[7]. It is reasonable to assume that television receiver intermodulation (IM) performance has improved over the last sixteen years. Therefore we ask that the Commission consider reducing Taboo restrictions where such restrictions impede early clearing of the upper 700 MHz spectrum.

21. As a further incentive for early clearing of out-of-core analog operations, the Commission should consider allowing an extension of the "hard cutover" date for those stations that elect to move these operations to their DTV allotment. This date is currently at December 31, 2005, but could be extended to the date for which the "85% penetration" has been deemed met. However, those broadcasters that elect to vacate the out-of-core allotments and move analog operations to their digital allotment must eventually undergo a hard cutover to DTV, since they will no longer have the ability to serve analog and digital markets simultaneously (unless they can get carriage of their digital signal on local cable systems). Because of this, we ask that the Commission not consider these cases when computing any such "penetration metric" for purposes of Section 309(j)(14)(B). Specifically, when the Commission considers an extension under Section 309(j)(14)(B)[8], any of the "four largest national television networks" that choose early cutover for analog operations should not be counted toward the extension criterion.

Report, Federal Communications Commission, Advisory Council on Advanced Television Service, October 31, 1995

[7] *"A Study of UHF Television Receiver Interference Immunities"*, Hector Davis, July 1987, FCC/OET TM87-2

[8] Where the Commission must grant an extension if one or more stations in the affected market that are licensed to or affiliated with one of the four largest national television networks are not "broadcasting a digital television service signal, and the Commission finds that each such station has exercised due diligence and satisfies the conditions for an extension of the Commission's applicable construction deadlines for digital television service in that market."

Replication, "Actual" Broadcast Parameters, and Protection

22. The deadline for cessation of analog operations may be as close as 3 ½ years away, and yet a large percentage of broadcast stations are still not on the air with DTV services. Thus, many broadcasters may ultimately only offer limited digital operations on their DTV allotment - in the expectation that their final DTV allotment will be on their current analog channel. This is in part due to the fact that the "transition" DTV transmitter may need to be replaced when DTV operations migrate to the analog channel, and therefore it is more cost effective for the broadcaster to operate with a lower power transmitter during the transition. This is especially true for out-of-core DTV operations, who must relocate to in-core allotments once the transition is complete. In order to allow for early access to the Public Safety spectrum, the Commission should pursue an aggressive deadline for service area replication with regard to out-of-core digital allotments, and those that choose not to meet the deadline should lose interference protection in areas not served due to operation with reduced parameters. However, these stations should still be afforded full protection from TV/DTV interference[9] on their final in-core allotment, understanding that maximum parameters would likely be employed once operations on those allotments commence.

23. In the same vein, the Commission has suggested that 90.545(c) and 27.60(b) be amended to make clear that interference protection should be fully afforded to authorized and applied for NTSC and DTV facilities. We disagree with this notion, as the most efficient utilization of the spectrum would be obtained when protection is

afforded based upon what is realistic, not what is ideal. As above, there should be an aggressive deadline for maximization of the service parameters of out-of-core analog operations (and corresponding service area maximization). Furthermore, in the period before such a deadline passes, the stations should only be protected based upon what parameters are being employed - with the caveat that until the deadline passes, Public Safety would be responsible for reducing their parameters if the broadcaster chooses to maximize their service based upon their licensed or allotted parameters. This gives Public Safety licensees the option of making any necessary adjustments if migration to full NTSC/DTV parameters occurs during the transition. In this case, individual Public Safety entities are in a better position than the Commission to assess the costs, risks, and benefits of having access to additional spectrum even if on a "quasi-secondary[10] basis.

Engineering Studies

24. When determining the eligibility for Public Safety operations to coexist in the vicinity of full-class analog and digital broadcast television services the Commission set forth the following in 90.545:

(1) Licensees of stations operating within the ERP and HAAT limits of paragraph (b) must select one of three methods to meet the TV/DTV protection requirements, subject to Commission approval:

(i) utilize the geographic separation specified in the tables referenced below;

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[9] Due to new or modified TV/DTV applications.

[10] The reason for the term "quasi-secondary" is that although the Public safety entity may need to reduce their parameters to allow for eventual utilization of the full broadcaster parameters, such a reduction would come with sufficient notice to minimize the impact on Public Safety operations.

(ii) submit an engineering study justifying the proposed separations based on the actual parameters of the land mobile station and the actual parameters of the TV/DTV station(s) it is trying to protect; or,

(iii) obtain written concurrence from the applicable TV/DTV station(s). If this method is chosen, a copy of the agreement must be submitted with the application.

25. With regard to the second option, the Commission offers little guidance on what this "Engineering Study" must include, nor does it specify or place bounds on assumptions that any such study must consider. The primary example on record is OET-69[11], however this is based upon television-to-television interference, which is different in many ways from Land-Mobile-Radio (LMR)-to-television interference. This is even less defined when one considers the interference aspects of mobile-to-TV-subscriber interference (where mobile transmitters roam throughout their service areas) - which is not dealt with anywhere within OET-69. Therefore, we ask the Commission for guidance and clarification in these areas.

Mobile Interference

26. The only way to completely evaluate mobile-to-TV-subscriber interference is to model mobile transmitters at *all* locations within any given services area. Thus, the number of computations increases rapidly[12], as the received power from *each* mobile transmitter location must be computed at *each* location within the Grade B contour, a very time consuming process. However, in our experience, these studies produce very accurate results even when the terminal points are only considered at the Grade

[11] FCC Office of Engineering and Technology*, "Longley-Rice Methodology for Evaluating TV Coverage and Interference",* July 2, 1997.

[12] as the square of a single base location study

B contour points[13], which are assumed to be a *64 dBuV/m*. This approach does not suffer from any significant loss of accuracy, because at the low mobile transmitter height (~ *2m*) interference power very quickly becomes blocked by terrain and ground-level clutter. An example of such a study is shown in Figure 2. From this figure it is clear that the separation distance imposed by Part 90.545 can be reduced considerably when a more detailed approach such as this is considered. Is this an acceptable methodology?

[13] In other words, all mobile transmitter locations are still considered, but instead of thousands of interior Grade B Contour points considered as receivers, only 180 to 360 of the Grade B sample points are considered. Though this is still a 180 to 360-fold increase in computations relative to a single study, it can be compared to a several-thousand-fold increase in computations to evaluate all interior Grade B points.

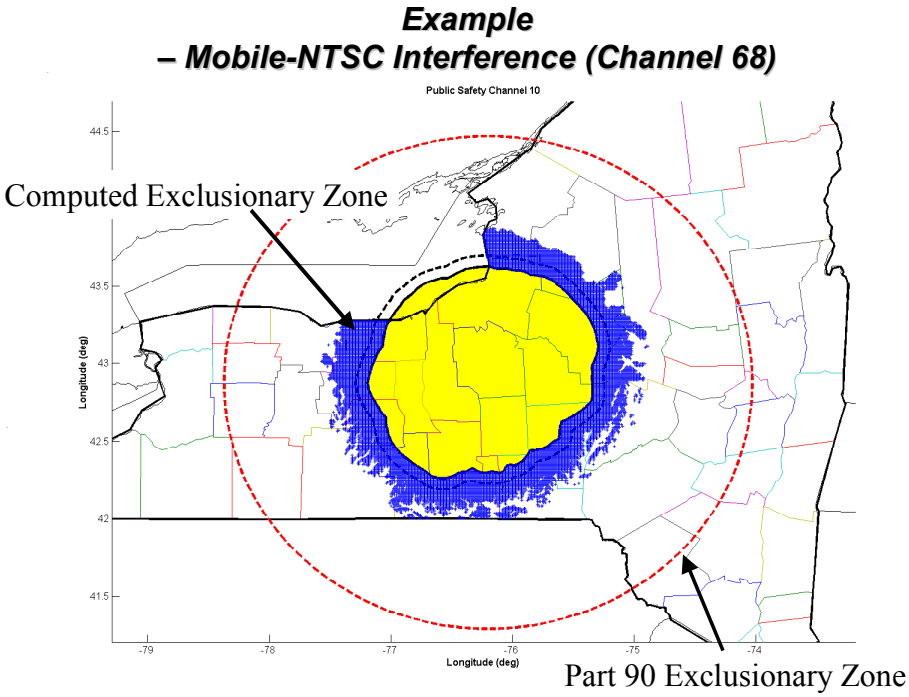

Figure 2: LMR Mobile to Television Interference, with Part 90 Separation Criteria

Antenna Parameters

27. As previously mentioned the primary example on record is OET-69. In terms of an engineering study, is Public Safety expected to follow all procedures within? If so, there are many questions that should be raised. First, what cross-polarization discrimination[14] should be applied? We recommend that a value of 15-20 dB is applied when evaluating base interference to television subscribers, and a value of 10-15 dB applied for mobile interference. Furthermore, OET-69 states that a television receiving antenna has a directional gain pattern that *"tends to discriminate against off-axis undesired signals"* with a $cos(\theta)^4$ pattern. This pattern model will have a

[14] (Footnote 377). FCC 98-191, WT Docket No. 96-86, 1998, FIRST REPORT AND ORDER AND THIRD NOTICE OF PROPOSED RULEMAKING, Adopted: August 6. "*The directional characteristics (front-to-back ratio) and polarization (horizontal vs. vertical) of UHF-TV receiving antennas discriminate against land mobile interference.*"

symmetric back lobe, and thus a front-to-back ratio of 0 dB. We recommend that this model be employed, but that all back-lobe undesired signals are attenuated by the front-to-back ratios listed in Table 6 of OET-69. Are these values and procedures acceptable to the Commission?

Frequency Specific D/U Criterion

DESPITE CLEAR DEPENDENCE ON SPECTRUM/CHANNEL LOCATION, THE CO-AND ADJACENT-CHANNEL SEPARATION CRITERIA IN 90.545 APPLY ONLY TO THE BROAD "CO-CHANNEL" AND "ADJACENT-CHANNEL" CASES. ALTHOUGH THIS WAS NO DOUBT DONE TO SIMPLIFY THE COORDINATION BETWEEN THE SERVICES, IT IS CLEARLY NOT AN EFFICIENT MECHANISM FOR SPECTRUM SHARING. FIGURE 7 IN ANNEX-A

28. Technical Parameters for Protection, shows measured D/U levels vs. frequency offset, with a 15 dB cross-polarization factor that brings the measured D/U to the range of that specified in 90.545[15]. In this figure the difference between this D/U and that specified in 90.545 are shown, clearly indicating the utility of utilizing channel specific protection criterion for maximum spectrum utilization and interference protection. From these differences estimates of separation distances can be generated. For typical LMR transmitter parameters, the difference in separation distance due to employing LMR channel specific D/U protection criteria against

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[15] (Footnote 376). FCC 98-191, WT Docket No. 96-86, 1998, FIRST REPORT AND ORDER AND THIRD NOTICE OF PROPOSED RULEMAKING, Adopted: August 6. *"In connection with the UHF-TV Sharing NPRM, the FCC's Laboratory performed TV receiver susceptibility measurements. See FCC Office of Engineering and Technology Report, "Receiver Susceptibility Measurements Relating to Interference between UHF Television and Land Mobile Radio Services, February 1987. The tests showed the median value for receiver susceptibility to be 45 dB."*

analog television is shown in Figure 8 of this Annex. This figure clearly shows that using such detailed criteria would not only allow for more efficient sharing of the spectrum, but would better protect television from interference from LMR operations on channels where higher interference potential exists. Again, this meets the stated objective of allowing maximum spectrum utilization for Public Safety while offering full protection to incumbent analog television services. Therefore, we ask the Commission to allow for such criterion to be employed within short spacing Engineering Studies.

29. Highlighting and utilizing channel specific criterion would not only protect TV but would offer Public Safety greater protection from the impacts that analog television has upon certain channels - including within the 700 MHz interoperability channel set. Examples of these are shown in Table 1. Here, values of power coupled into LMR bandwidth (and an ANSI-102 IF Filter model) are shown relative to total television transmitter power. For illustrative purposes, for a 5 megawatt TV transmitter, the power coupling into these IF filters will be very high - on the order of 6 kilowatt to 2.8 megawatts of equivalent in-band power being radiated at the television transmitter. This can have very far-reaching interference impacts; especially on towertop Public Safety receivers located on television channels 68 and 69.

Table 1: 700 MHz Public Safety Interoperability Channels with High Power Coupling to Analog Television

Type	Channel Number	Frequency of Lower Edge (MHz)	In-Channel Power (dB_{TV}) 6.25 kHz	In-Channel Power (dB_{TV}) 12.5 kHz	In-Channel Power (dB_{TV}) 25.0 kHz	Coupled Power (dB_{TV}) ANSI-102 IF	Co-Interfering Channel
Interoperability	**199**	765.23750	-1.95	-1.95		-2.51	63
Interoperability	**921**	775.75000	-21.82	-20.92	-20.49	-22.44	64
Interoperability	**922**	775.75625	-28.22			-29.36	64
Interoperability	**1159**	795.23750	-1.95	-1.95		-2.51	68
Interoperability	**1881**	805.75000	-21.82	-20.92	-20.49	-22.44	69
Interoperability	**1882**	805.75625	-28.22			-29.36	69

III. THE COMMISSION MUST EXPEDITE CLEARING OF THE UPPER 700 MHZ BAND TO THE MAXIMUM EXTENT POSSIBLE UNDER SECTION 309(J)(14)(B).

30. Much of the *NPRM* addresses the complex provisions of Section 309(j)(14)(B) of the Communications Act, which defines those circumstances under which the Commission is required to permit an analog television station to continue operating past December 31, 2006. This matter is of critical importance to Public Safety, as it will determine when the 24 MHz of spectrum allocated in 1997 for Public Safety radio services will in fact be available for actual use. Public safety agencies need that spectrum today.[16] Thus, the Commission must interpret the statute to minimize the time before analog televisions stations are required vacate the Upper 700 MHz band.

31. Section 309(j)(14)(B) requires the Commission to extend the date by which stations must cease analog operations, if certain specified conditions are met. In general, the statute establishes benchmarks to determine when access to DTV has reached a

[16] The Public Safety community has thus strongly advocated repeal of Section 309(j)(14)(B), at least as to those television stations that block Public Safety use of the 700 MHz band.

specified level in a particular television market. Until those benchmarks are met, analog stations qualify for extensions past December 31, 2006.[17]

32. The first issue raised in this portion of the *NPRM* is whether the Commission should grant blanket extensions, either by market or nationally, rather than granting extensions on a station-by-station basis. NYS-OFT opposes blanket extensions, at least as to channels 60-69, which block the Upper 700 MHz band. Those stations

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[17] Section 309(j)(14) provides:

> (A) LIMITATIONS ON TERMS OF TERRESTRIAL TELEVISION BROADCAST LICENSES. – A television broadcast license that authorizes analog television service may not be renewed to authorize such service for a period that extends beyond December 31, 2006.
>
> (B) EXTENSION. – The Commission shall extend the date described in subparagraph (A) for any station that requests such an extension in any television market if the Commission finds that –
>
> (i) one or more of the stations in such market that are licensed to or affiliated with one of the four largest national television networks are not broadcasting a digital television service signal, and the Commission finds that each such station has exercised due diligence and satisfies the conditions for an extension of the Commission's applicable construction deadlines for digital television service in that market;
>
> (ii) digital-to-analog converter technology is not generally available in such market; or
>
> (iii) in any market in which an extension is not available under clause (i) or (ii), 15 percent or more of the television households in such market –
>
> (I) do not subscribe to a multichannel video programming distributor (as defined in section 602) that carries one of the digital television service programming channels of each of the television stations broadcasting such a channel in such market; and
>
> (II) do not have either –
>
> (a) at least one television receiver capable of receiving the digital television service signals of the television stations licensed in such market; or
>
> (b) at least one television receiver of analog television service signals equipped with digital-to-analog converter technology capable of receiving the digital

should be required to make separate showings, or at least demonstrate why a proposed blanket waiver is applicable to their situation. Under no circumstances should a channel 60-69 station be allowed to "piggy back" onto a blanket extension that may not otherwise apply to its situation.

33. The *NPRM* also seeks comment on the definition of "television market" for various aspects of Section 309(j)(14)(B). Two options are presented, Nielson designated market areas ("DMAs"), or the Grade B contour of the relevant station. The *NPRM* examines these different definitions in detail, and seeks comment on the potential impact of each (see ¶ 78). NYS-OFT urges that the Commission adopt whichever definition meets the requirements of the statute, AND would prevent analog stations from remaining on channels 60-69 any longer than necessary.

34. Section 309(j)(B)(i) requires that an extension be granted if just one of the four major network affiliates in the relevant market is not "broadcasting a digital television service signal." The plain meaning of the statute would suggest that any provision of DTV service meeting minimal Commission requirements would satisfy the test. Yet, the Commission inquires whether it should go further and interpret "broadcasting a digital television service signal" to mean replication of the stations analog service area. The Commission must reject that overly expansive definition, as it could encourage stations to delay replication of their analog signal by a nominal amount, and thus postpone giving up their analog channel.

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television service signals of the television stations licensed in such market.

35. The second ground for extending the DTV conversion date in a particular market depends upon whether digital-to-analog converter technology is "generally available." Once again, the Commission needs to interpret this provision narrowly, so as not to cause unnecessary delays in the conversion date. For example, in today's electronic marketplace, a product's availability on the Internet, and perhaps also at a small number of national electronic retail chains, would appear to be more than sufficient to satisfy the "general availability" test.

36. Section 309(j)(14)(B)(iii) also provides that an extension must be granted if 15% or more of the households in the market do not subscribe to a cable or other multi-channel programming distributor that carries the digital signals of all of the television stations in the market. Here again, how the statute is interpreted will have great bearing on the speed of the digital transition. For example, as discussed in paragraph 87 of the *NPRM*, the Commission should consider only those stations entitled to must-carry. Otherwise, if there is just one station not subject to must-carry in the market (especially if "market" is defined by DMAs), the DTV transition could be postponed indefinitely. Similarly, the Commission should not consider whether carriage includes Class A, LPTV, and TV Translators, as that too could cause extensive, unnecessary delay in the DTV conversion date.

37. NYS-OFT does not herein address each of many additional variations and interpretations addressed in the *NPRM* regarding Section 309(j)(14)(B). Rather, we simply urge that in every case, the Commission determine which interpretation will reduce the delay in DTV transition, and adopt that definition consistent with the express language of the Act.

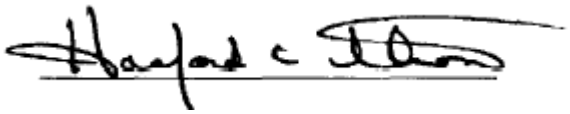
38. Therefore, the Commission must take every reasonable step within in its authority to maximize the extent to which Public Safety can use the Upper 700 MHz band during the remainder of the transition period. The Commission must also interpret existing rulings in a manner that will expedite the day when the entire band is clear of broadcast stations and available for Public Safety communications nationwide.

IV. CONCLUSION

39. Our general comments within this filing embody an overall philosophy that seeks to maximize and expedite Public Safety (and commercial) utilization of 700 MHz spectrum, while at the same time ensuring that band sharing will be free from interference.

40. The areas of the country where Public Safety needs this spectrum most are also the areas most populated with television operations on Channels 60-69. Because of this the Commission must take every reasonable step within in its authority to maximize the extent to which Public Safety can use the Upper 700 MHz band during the remainder of the transition period. The Commission must also interpret existing rulings in a manner that will expedite the day when the entire band is clear of broadcast stations and available for Public Safety communications nationwide.

Respectfully Submitted,



Hanford C. Thomas, Director
April 21, 2003

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ANNEX-A

TECHNICAL PARAMETERS FOR PROTECTION

1. It is clear that when the original separation criterion was decided upon by the Commission there was not industry consensus on the protection levels that afforded interference protection while allowing maximum availability of the 700 MHz spectrum during the DTV transition. In this proceeding the Commission has again requested comment on a number of issues regarding the interference protection afforded to TV/DTV operations by Public Safety operations. We welcome this opportunity to re-examine the separation criterion for interference protection to television services.

2. It is important to understand the power spectrum characteristics of both the DTV and NTSC signals. For illustrative purposes these are included here as Figure 3. Here it is clearly seen that nearly all of the signal power of the analog signal is concentrated in either the video or audio carriers. As such, most of the information content lies within these carriers and their near-in sidebands. The digital signal has its power and information content spread uniformly throughout its bandwidth, making maximum use of its occupied spectrum.

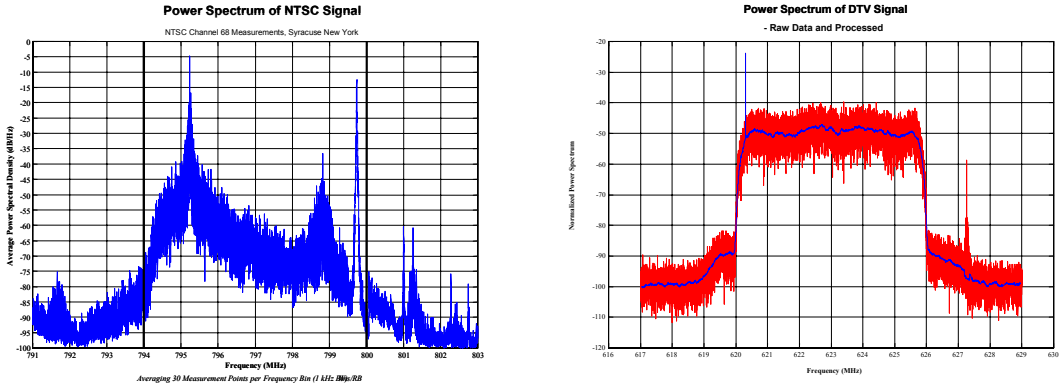

Figure 3: NTSC (Left) and DTV (Right) Power Spectrum

3. It is also important to understand the spectrum aspects of LMR to television (and vice-versa) interference. Figure 3 is included here in order to provide a view of the bandwidth scale of these services. Here it is clear that the LMR signal can be considered a narrowband, high power spectrum density interferer to the analog television signal that is overlaid, and the victim television receiver will capture all of the LMR signal power. Conversely, the television signal will either be a very high-powered narrowband interferer to the LMR receiver[18], or will only introduce a raise in the noise floor of the LMR receiver[19].

[18] If the receiver is tuned near one of the subcarrier locations within the television signal.

[19] Away from the main and sub-carriers, the LMR receiver will only capture their (low level) sideband energy.

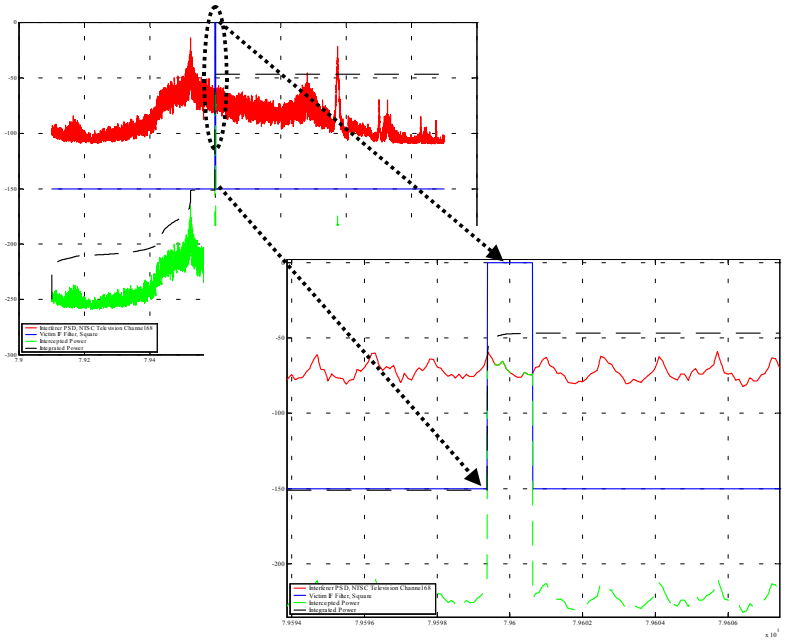

Figure 4: Narrowband (LMR) and NTSC Television Interference

4. With regard to interference protection, there appears to be some inconsistent criterion applied throughout the rules. Table 2 presents a collection of co-and adjacent channel protection information from several sources. Column I of this table references the co-channel NTSC-to-NTSC television protection from OET-69[20]. Column II of the table references the co-channel LMR-to-NTSC television protection as specified in Part 90.545 of the Commission's rules. Column III of the table references the co-channel NTSC-to-DTV television protection from OET-69 and Part 73.623 of the Commission's rules. Column IV of the table references the co-channel LMR-to-DTV television protection as specified in Part 90.545 of the Commission's rules. Column V represents the protection difference in dB between Column I ((NTSC-to-NTSC) and Column III (NTSC -to-DTV), indicating the additional robustness of the digital

[20] FCC Office of Engineering and Technology, *"Longley-Rice Methodology for Evaluating TV Coverage and Interference"*, July 2, 1997.

signal to interference. Finally, Column VI presents values of discrete frequency interference as measured indicated in Section 5.2.5 of the Final Technical Report of the Commission's Advisory Council on Advanced Television Service (October 31, 1995).

5. There are some inconsistencies among these values that are immediately apparent. To begin, LMR is required to provide an additional 12 dB of co-channel protection to analog television over that required between analog television stations, even though both analog television and LMR operations can both be considered high-power-density narrowband interferers. In a similar fashion, LMR is required to provide an additional 3 to 13 dB of adjacent-channel protection to analog television over that required between analog television stations (again, both analog television and LMR operations can both be considered to be similar interference sources). These protection levels seem much too conservative and should be re-examined.

6. LMR is also required to provide an additional 15 dB (17 dB-2 dB) of co-channel protection to digital television over that required from analog to digital television stations, even though again, both analog television and LMR operations can both be considered high power density narrowband interferers. At a minimum, the LMR protection to co-channel television appears approximately 4 dB too conservative based upon the Commission's own reports[21]. LMR is also required to provide an additional 25-26 dB of adjacent-channel protection to digital television over that

[21] See Table 5.6, Discrete Frequency Interference (In-Band, at 1.1 dB, +/2.0 dB), *Final Technical Report, Federal Communications Commission, Advisory Council on Advanced Television Service,* October 31, 1995. If the Commission intended that the additional 4 dB was to include a margin for variance, note that

required from analog to digital television stations. Again, these protection levels should be re-examined.

7. The differences between analog and digital protection also bear mention. In the First Report and Order of the 700 MHz Public Safety Docket[22], Commission chose not to form a Technical Advisory Council to examine LMR to DTV interference protection guidelines, and instead chose to apply protection that was essentially the same as for analog television. This seems dramatically over-conservative given the urgent need that Public Safety has to utilize the 700 MHz spectrum. In Table 2, we see from Columns II, IV, and V that DTV exhibits an additional 23-24 dB of robustness with respect to co-channel analog and LMR interference, which is consistent. However, for adjacent channel interference, the DTV signal is shown to offer 36 to 45 dB of additional protection from analog interference (as opposed to analog television to analog television), while still only reflecting 23 dB of additional robustness to adjacent channel LMR interference - a 13 to 22 dB difference! Not only should these levels be the same, they are also inconsistent with the results from the Commission's own Advisory Council on Advanced Television Service, which measured discrete frequency interference levels into DTV at -45.8 dB[23]. From this, it is clear that the Commission's current rules are approximately 22 dB too restrictive with regard to LMR to DTV interference protection levels.

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no such margin was utilized for analog to DTV interference, whose 2 dB protection level corresponds to the 1.81 dB measured in Advisory Council's technical report (see Table 5.1).

[22] Para 154-155, FCC 98-191, WT Docket No. 96-86, 1998, FIRST REPORT AND ORDER AND THIRD NOTICE OF PROPOSED RULEMAKING, Adopted: August 6

[23] at 2 dB, see Table 5.1, *Final Technical Report, Federal Communications Commission, Advisory Council on Advanced Television Service,* October 31, 1995

Table 2: Interference Protection Levels ((Multiple Sources)

Channel Offset	I. Required (OET-69) NTSC-NTSC D/U (dB)	II. Required (90.545) LMR-NTSC D/U (dB)	III. Required (OET-69/ 73.623) NTSC-DTV D/U (dB)	IV. Required (90.545) LMR-DTV D/U (dB)	V. Δ (I.-III.) (dB)	VI. Discrete Frequency Interference Performance of ATSC[24] D/U (dB)
Lower Adjacent	-3	0	-48	-23	45	-48.5 (+/- 3.5 dB)
Co-Channel	28	40	2	17	26	11.1 (+/- 2 dB))
Upper Adjacent	-13	0	-49	-23	36	-48.5 (+/- 3.5 dB)

8. With regard to LMR to analog television interference, it is clear that the analog television power spectrum is non-uniform (ref. Figure 3). As a reference, Figure 5 illustrates which portions of the 700 MHz channel allocation fall on what dominant portions of the analog television signal. Figure 6 presents the average raw results from the Commission's last known study on LMR to analog television interference[25]. Note that these are the raw results, which appear to be 15-20 dB above what is specified in Commission rules. From this it is clear that D/U requirement is extremely dependent upon the LMR interferer's spectral location relative to the television receiver.

[24] See *Final Technical Report, Federal Communications Commission, Advisory Council on Advanced Television Service,* October 31, 1995

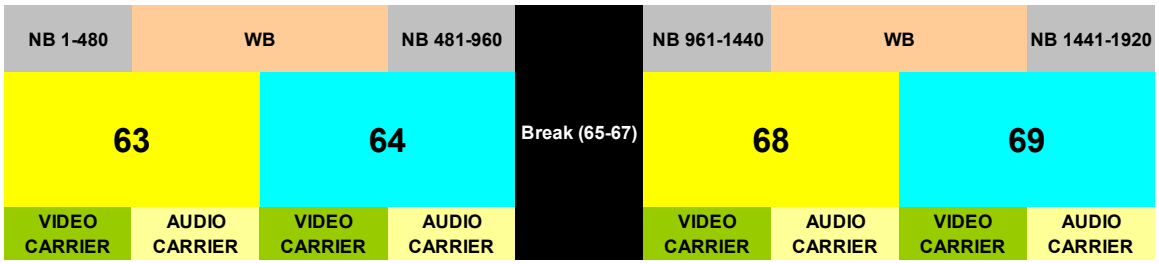

Figure 5: 700 MHz Public Safety Channels and Analog Television Carrier Locations

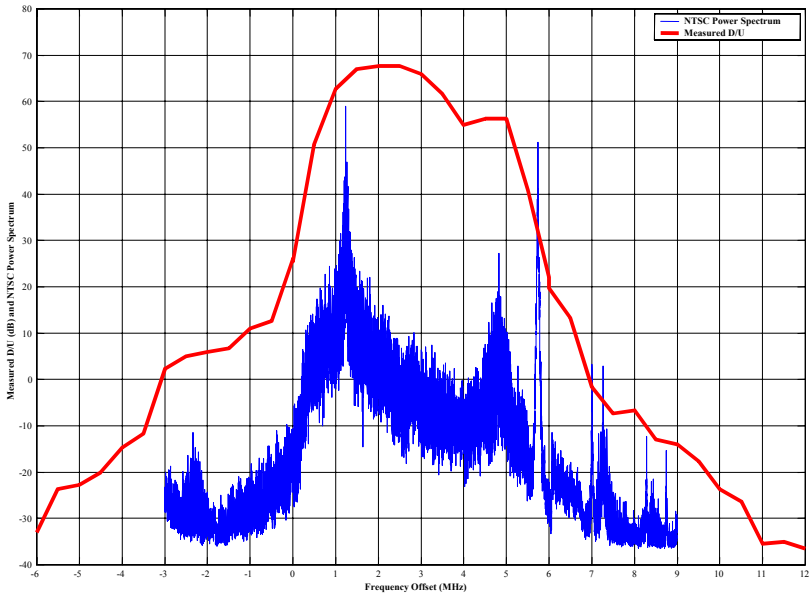

Figure 6: Measured LMR to Analog TV (D/U) with Analog TV Spectrum Overlay

9. Despite the dependence on spectrum location, the co-and adjacent channel separation criteria in 90.545 apply only to the broad "co-channel" and "adjacent-channel" cases. Although this was no doubt done to simplify the coordination between the services, it is clearly not an efficient mechanism for spectrum sharing. Figure 7 again shows the measured D/U, but a 15 dB cross-polarization factor that brings the measured D/U to

[25] *Receiver Susceptibility Measurements Relating to Interference Between UHF Television and Land Mobile Radio Services*, Daniel J. Stanks, April 1986, FCC/OET TM87-1, Project No. EEB-84-4

the range of that specified in 90.545[26]. In this figure the difference between this D/U and that specified in 90.545 is also shown, clearly indicating the utility of utilizing channel specific protection criterion for maximum spectrum utilization and interference protection.

[26] (Footnote 376). FCC 98-191, WT Docket No. 96-86, 1998, FIRST REPORT AND ORDER AND THIRD NOTICE OF PROPOSED RULEMAKING, Adopted: August 6. *"In connection with the UHF-TV Sharing NPRM, the FCC's Laboratory performed TV receiver susceptibility measurements. See FCC Office of Engineering and Technology Report, "Receiver Susceptibility Measurements Relating to Interference between UHF Television and Land Mobile Radio Services, February 1987. The tests showed the median value for receiver susceptibility to be 45 dB."*

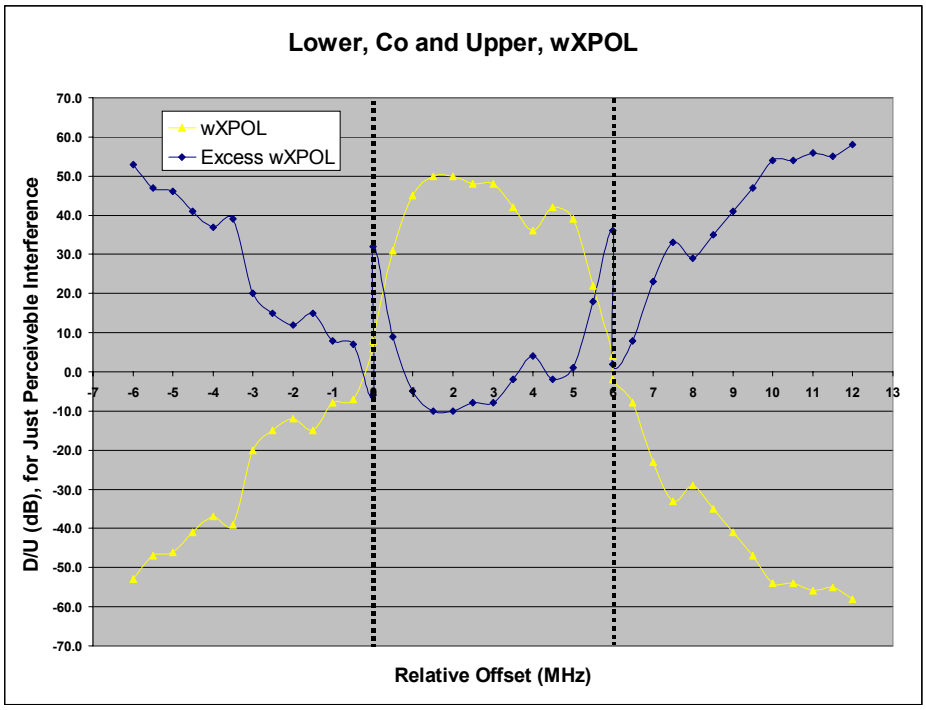

Figure 7: LMR to Analog TV Protection Levels, with Difference from 90.545

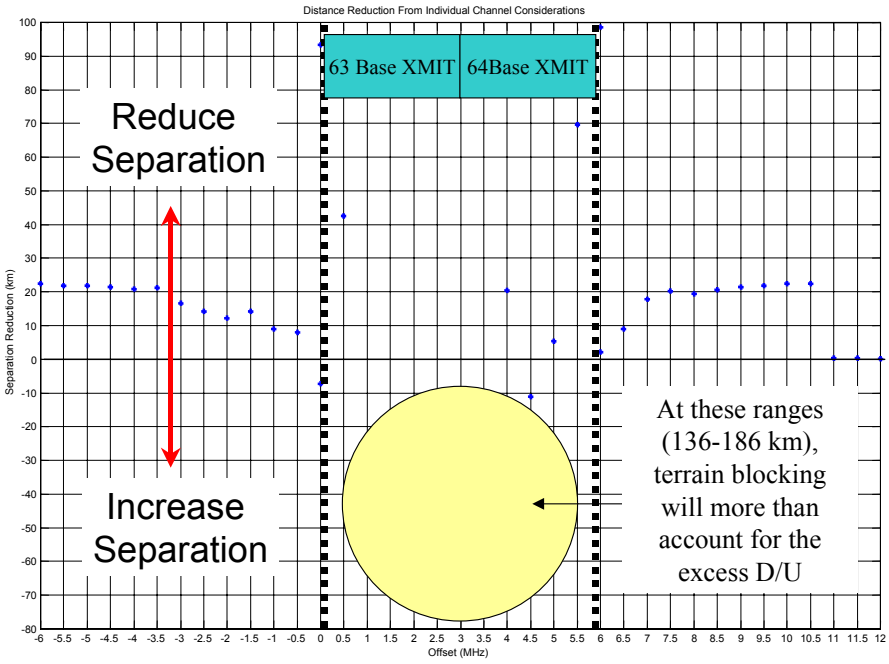

Figure 8: Separation Distance Difference due to D/U Differences with 90.545

10. From the differences in D/U shown in Figure 7, estimates of separation distances can be generated. For typical LMR transmitter parameters, the difference in separation distance due to employing LMR channel specific D/U protection criteria against analog television is shown in Figure 8. This figure clearly shows that using such detailed criteria would not only allow for more efficient sharing of the spectrum, but would better protect television from interference on the channels that it is more sensitive to interference from. Again, this meets the stated objective of allowing maximum spectrum utilization for Public Safety while offering full protection to incumbent analog television services. Therefore, we ask the Commission to either (a) modify the rules to employ such channel-specific criterion, or (b) allow for such criterion to be employed within short spacing Engineering Studies.